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12 March 1970

DEVELOPMENT OBJECTIVE
TRAINING NEEDS ASSOCIATED WITH COLOR PHOTOGRAPHY

1. INTRODUCTION

1.1. Purpose - The objectives of the proposed NPIC-sponsored research effort are fourfold.

1.1.1. Develop a standard "color vocabulary" for use within the Center.

1.1.2. Provide a literature review of information relevant to color vision as it applies to Center operations.

1.1.3. Determine the specific NPIC color-oriented training needs and the training resources currently available to the Center.

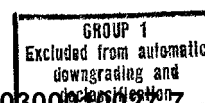
1.1.4. Recommend what steps should be taken to satisfy the training needs isolated in 1.1.3.

1.2. Background - There is every indication that the introduction of the high resolution color acquisition film (SO 242) will provide photo interpretation that long-awaited additional dimension of information - the spectral characteristics of a target or area of interest - without suffering the severe resolution degradation typical of its predecessors. Furthermore, there is reason to expect that technical breakthroughs are imminent for other types of "unconventional imagery" such that before long, a family of special purpose, high quality acquisition and duping materials will be available to augment conventional black/white photography. In response to these very recent advances in the state-of-the-art, Center and Community planners have prophesied that by the mid 1970's, at least half of the input to the Center will be in color.

1.2.1. Tonal and spatial information hold promise for improving both target identification and target detection, given the potentially enormous range of hue, saturation and value interactions aiding the identification of targets (color coding) or contrasting one target from another or from its background (target conspicuity).

1.2.2. A consideration, required upon the injection of a new element into a complex system such as photo interpretation, is the assurance that personnel who must produce and employ the product understand how it will affect their normal procedures as well as those of others in the chain. Several training courses in "unconventional imagery" have

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been attempted in the Center for just this reason. With the exception of special purpose briefings developed for a limited, technically homogeneous audience, "broad brush" color training sessions have been over-technical and, accordingly, have proven to be unsatisfactory to large segments of the Center's population. That is not to say that highly technical seminars do not have a place in the Center's operations; they do. However, a single, comprehensive course appears not to be the answer to the Center's color training needs.

2. CONCEPT

2.1. Scope - In order to assure maximum utilization of color photography, or the more generic "unconventional imagery", all Government personnel involved with the acquisition, production and exploitation of the materials must be grounded in the fundamentals of the new imagery and techniques related thereto. Each person so involved should appreciate the unique capabilities and liabilities of the several types of imaging systems, especially as the new products precipitate a change in his current modus operandi.

2.1.1. It appears that a comprehensive color training program will involve a number of audiences with markedly different interests, and that the success of such a training program will be gauged by the extent to which it satisfies the most pressing needs of the audience. As a result, the training directors must be cognizant of and have the resources necessary to prepare and comply with these needs.

2.1.2. With few exceptions, the Center and the Intelligence Community are not yet in a position to define their color training needs. In many cases, the research necessary to stipulate training requirements has yet to be performed. Consequently, training programs, especially as they relate to intelligence information as opposed to photo technology, can be expected to issue directly from the most recent research findings. Hence, they must be structured so as to allow for the introduction of new information as well as the modification, or at least qualification, of previous philosophies to reflect the dynamics of current R&D efforts.

2.1.3. The proposed investigation will be a four-part effort to provide the Center, in the following order of delivery:

2.1.3.1. A recommended "color vocabulary", citing applications for use within the Center and in communications between the Center and components of the Intelligence Community.

2.1.3.2. A review of the literature relevant to the human perception of color, with particular emphasis on the perception of color photography and transparencies.

2.1.3.3. A thorough determination of the current and anticipated color-specific training needs of, and training capabilities available to, Center personnel who are involved with the production, evaluation and exploitation of color photography, including managerial and engineering personnel.

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2.1.3.4. A recommended approach for implementing the color training for Center personnel cited in 2.1.3.3.

2.1.4. In all cases, the contractor shall emphasize the manner in which SO 242 acquisition material, the dupe stock for reproducing SO 242, and the techniques attendant to the production, reproduction, exploitation and interpretation of SO 242-related photography and information derived therefrom, will modify current Center operations. However, proper allowance must be maintained to treat additional "unconventional" materials as well.

3. REQUIREMENTS

3.1. Objectives - The primary requirements of this program are to:

3.1.1. Provide a comprehensive glossary of color-oriented nomenclature applicable to the various activities within the Center. The intent of this effort is to have the contractor design a standard "color vocabulary" to ease the problem of communication among the several disciplines concerned. The "vocabulary" should be so designed as to include and interrelate, when feasible, the physical, psychophysical and psychological terminology and concepts as they apply to Center operations. Graphical as well as textual illustrations are encouraged when and if they improve comprehension. It should be assumed that the users of this document will be of diverse technical and professional background. The product should reflect such diversity. Furthermore, the effort will require that the contractor determine the degree of specificity of, and a recommended notation system for the physical and perceptual attributes of the unconventional imagery--especially as related to SO 242. One of the most pressing needs of the Center at the moment is to agree upon a standard terminology for describing color signatures of targets. However, the Center and the Community in general have not progressed much beyond the most preliminary stages of investigating the color signatures issue from either an interpretation or requirements perspective. It is recognized that the Center must support the contractor by making available to him the results of the Government's work in this area; providing to him the characteristics of the emulsions employed in unconventional imagery exploitation, and assisting him in gaining familiarity with the Center's operations. It shall be the task of the contractor to assess previous evaluations and to arrive at a standardized "vocabulary" suitable for broad usage within the Center.

3.1.1.1. For every definition included within the glossary, the contractor must seek accuracy with respect to technical content.

3.1.1.2. If and when the contractor recommends adoption of a term or scale, etc. as a standard that is at odds with the current national or international standards, he must in every instance make note of this departure and justify it in writing.

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3.1.2. Review and document the literature relevant to the perception of color as it relates to the production, evaluation and exploitation of color photography (transparencies as well as prints) within the Center.

3.1.2.1. Included within this document will be discussions of:

3.1.2.1.1. The physiological basis of color vision.

3.1.2.1.2. Those stimulus characteristics responsible for the perception of color, including the effects of interactions of such stimulus parameters upon visual and perceptual sensitivity.

3.1.2.2. Primarily atheoretical in its approach, the report should strive to apply relevant portions of the existing literature in color vision and perception to the typical operations and problems found within the Center.

3.1.3. Determine and report upon the immediate and future color-specific training needs of Center personnel who are charged with the responsibility of producing, evaluating, exploiting, and reporting on color photography and related equipment. Management color-training needs should be assessed as well. In addition, the contractor should make careful note of training capabilities currently available to the Center. This task will necessitate having the contractor familiarize himself with Center operations to the extent that he can generate a list of unique, generic job description characteristics of Center personnel--within the context cited above--and relate to each the associated color-training requirements. The documentation detailing these training needs should be structured in such a fashion that for each separate topic, there will be sufficient detail as to lead directly to a training program outline without necessarily being involved in the manner in which the information should be presented to Center personnel. That task will be addressed in 3.1.4. The following list of suggested categories exemplifies the variety of topics to be considered as candidates for the training program. It is by no means all inclusive, and it is tendered for information purposes only.

(a) General orientation - the role of color photography in photographic reconnaissance.

(b) Comparison of different types of color products and the application of each to the photographic reconnaissance effort.

(c) Intelligence value (information content) of aerial color photography by target and film types.

(d) Color signature determination by target type.

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- (e) Color signature exploitation techniques by target type.
- (f) Color-oriented targeting requirements.
- (g) Environmental influences on color photography (color fidelity).
- (h) Photo technology of acquisition and reproduction color emulsions.
- (i) Photographic processing techniques, products and applications.
- (j) Color perception and applications.
- (k) Mensuration techniques and accuracy (edge definition, special techniques, spatial versus tonal differentiation, etc.).
- (l) Exploitation hardware requirements and special modifications thereto.
- (m) Intelligence of color photography:
 - 1. Color signatures per emulsion/target conspicuity.
 - 2. Reporting techniques.
 - 3. Keys (generation and utilization).
 - 4. Exploitation hardware.
 - 5. Special exploitation techniques.
- (n) Techniques for assessing spectral fidelity of images.

3.1.4. Propose an implementation plan for satisfying those color training needs established in 3.1.3.

3.1.4.1. The specific course that will be followed in this task is left to the discretion of the contractor. It is suggested, however, that he consider the possibility of employing the list of generic job descriptions obtained in 3.1.3. and interrelating to each a recommended training action. The justification for this task rests primarily upon the philosophy that there is no single training approach--formal course, bibliography, seminar or what-have-you--that by itself will satisfy all of the color training requirements of the Center. Moreover, it appears likely that there is no single Government, industrial or academic source of professional expertise that could address in sufficient detail the broad spectrum of topics of interest to the Center. It will be, therefore, the Government's prerogative to select the technique and/or source of manpower to provide color training, with the contractor charged with the responsibility of supporting the training program by defining the problem areas and proffering solutions to them. Specifically, the contractor shall propose training techniques, sources and options most appropriate to each unique training need. The contractor is enjoined to

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bear in mind that questions regarding the intelligence value of color photography are undergoing constant revision and updating, and as such, shall undoubtedly complicate to some extent efforts to develop a systematic training program. The recommended training approaches and options must reflect such dynamics.

4. GENERAL

4.1. Proposals - The proposal shall be as follows:

(a) Task Abstract - Contents - Synopsis of task within 12 lines, plus estimated cost of direct labor, material, overhead, G&A, fee, total.

(b) Introduction - Contents - Covering background and task justification rationale.

(c) Technical Discussion - Contents - Detail and subsections as a function of the task.

(d) Work Statement - Contents - This statement should succinctly describe the individual tasks to be done and should be sufficiently definitive that one may read this section to understand the purpose and scope of the tasks.

(e) Deliverable Items - Contents - Type of reports.

(f) Project Schedule - Contents - Percentage of project completion by months and related schedule of percentage of project expenditures by month in tabular form.

(g) Time Bar Chart

(h) Financial Considerations - Contents - Cost details, summary, GFE required.

4.1.1. While it is the wish of the Government to accomplish the aims of this program as expeditiously as possible, sufficient time should be allotted for a thorough and complete accomplishment of the aims set forth herein. Tentatively, it is envisioned that the program will be completed within 12 months from the time that an adequate number of contractor personnel have been granted proper security clearances.

4.2. The Center is currently contracted for studies in PI Human Factors, Image Manipulation, Image Evaluation, and Image Processing. The successful contractor for the study as outlined herein is not to address these areas except, after determination through the Government's Technical Representative, that a specific aspect of these projects is in conflict with this study. Reports and results of these studies will be made available to the contractor, as required.

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4.3. Program Interface - Although the work to be performed under the terms of this document is confined to the investigation of color training requirements, interfaces will exist between this program and other studies underway within the Government. It is anticipated that liaison (associate contractor relationship) between the contractor selected for this program and the contractors conducting related internal studies will be such that this program will result in a compatible and integrated overall exploitation research program.

4.4. Administration - The Government will retain overall program management. Written approval from the contracting officer must be obtained before any changes in objectives, costs, or priorities are effected or before any subcontractor or consultant is employed.

4.5. Contractor Responsibility - The contractor is expected to provide competent and cooperative administrative service. He will be vested with certain authority to control the direction and degree of technical effort within the bounds of the estimated costs. As a part of his overall responsibility, the contractor will be responsible for the work performed by all of his subcontractors and consultants. The fact that the Government has granted approval for the use of a specific subcontractor or consultant in no way relieves the contractor from this responsibility. The contractor shall state in his proposal those subcontractors and/or consultants he plans to use in this program.

4.6. Technical Representative - The contracting officer will designate a technical representative to provide technical guidance, liaison, and authorize specific project efforts of the contractor. Such authorization shall be given in writing in its original form or in confirmation of an oral authorization. The contractor will accept no other authorization, except that of the technical representative or contracting officer.

4.7. Reports - Periodic technical reports will be submitted as required throughout the life of the contract. All reports, including a detailed final report, will meet the basic requirements of specification DB-1001, dated 31 August 1966, GENERAL REQUIREMENTS FOR CONTRACTUAL DOCUMENTATION, attached hereto. In addition to the detailed final report, a supplementary final report will be required summarizing the results of the study and the operational concepts derived.

4.8. Personnel Availability - Where possible, the contractor should make maximum use of Government expertise, particularly in the fields of interpretation, mensuration, training, photo technology and human factors. The expected scope of utilization of Government personnel shall be clearly delineated in the proposal.

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